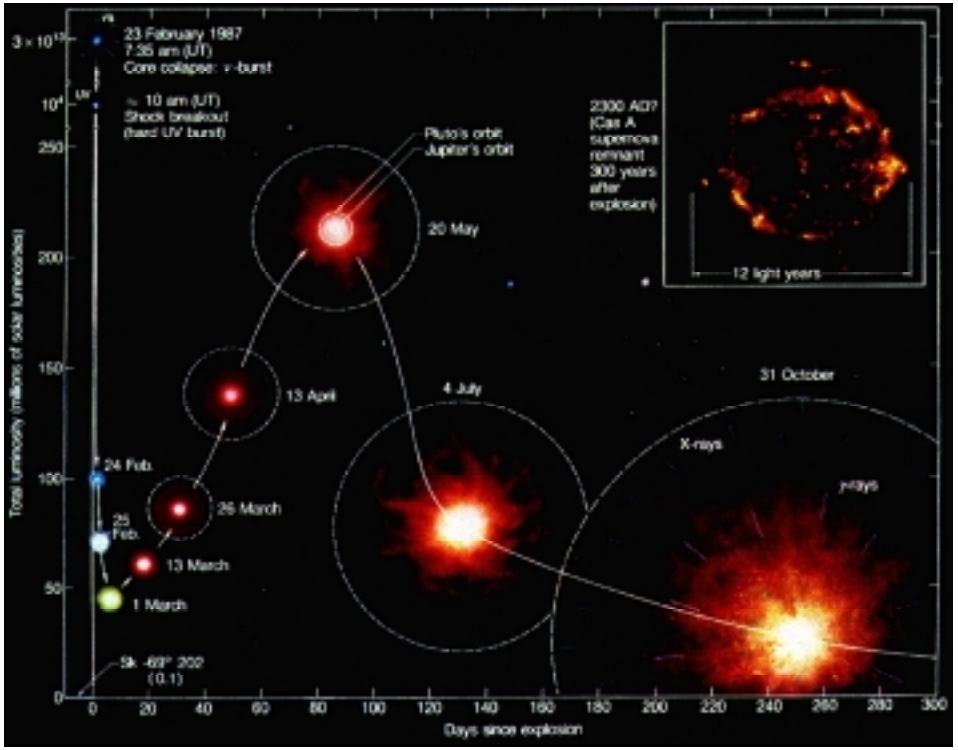
Radiation flow / Supernova light curves

Radiation flow is a fundamental component of astrophysics

Eagle nebula

Stationary medium

SN1987A light curve

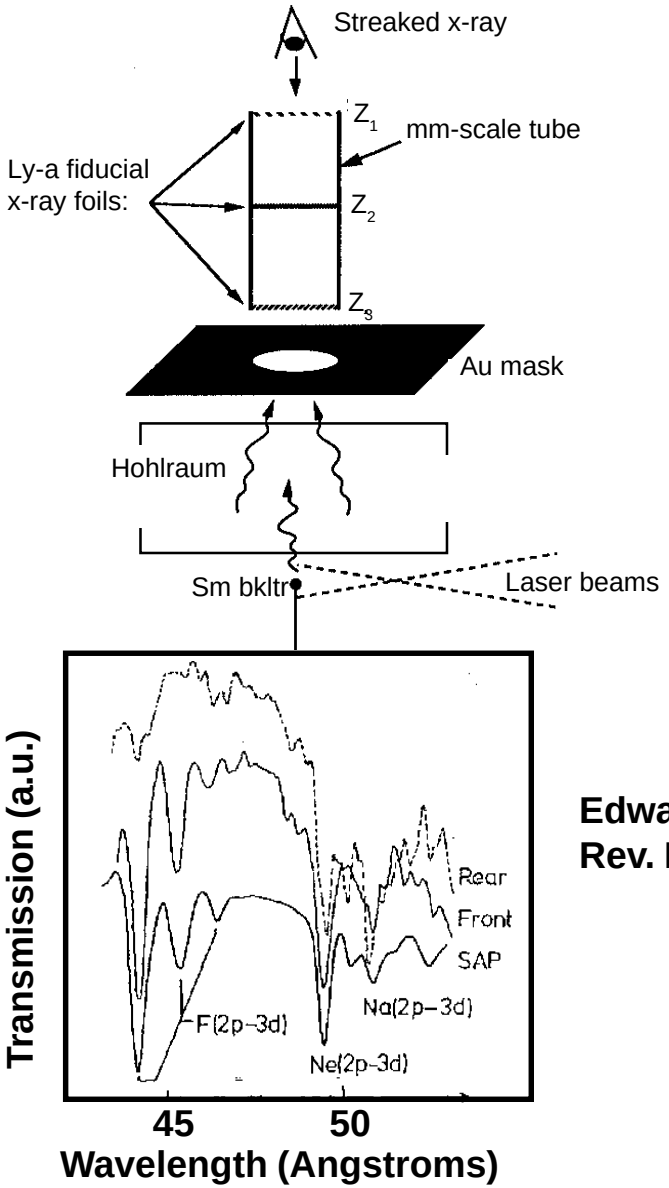


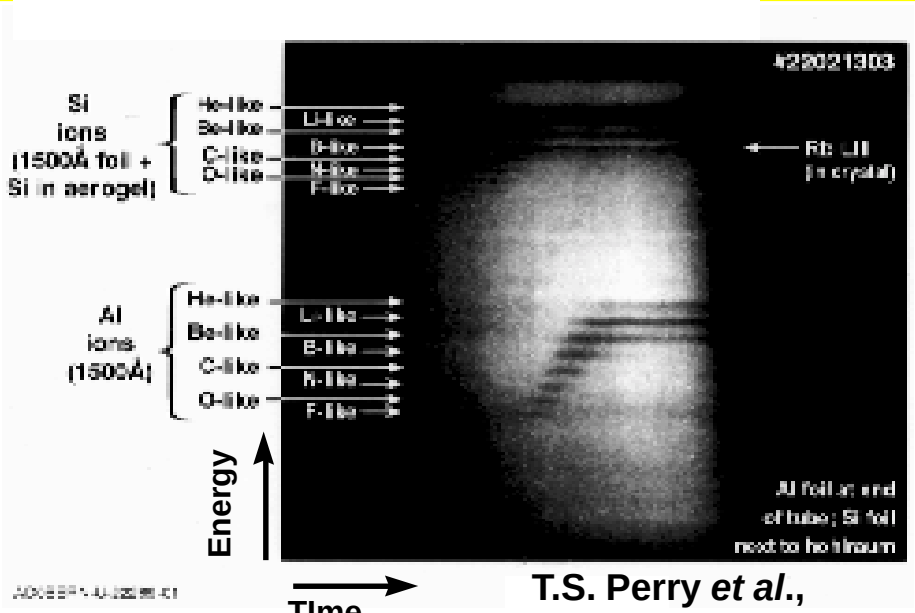
Expanding medium

P01078-pts-u-009

Eagle+SN1987A.vg

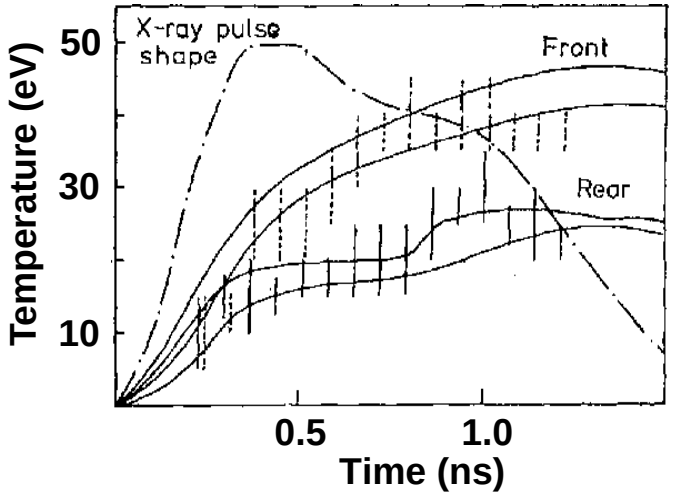
Radiation flow experiments in static media, using buried tracer layers have been done on the Nova and Vulcan lasers





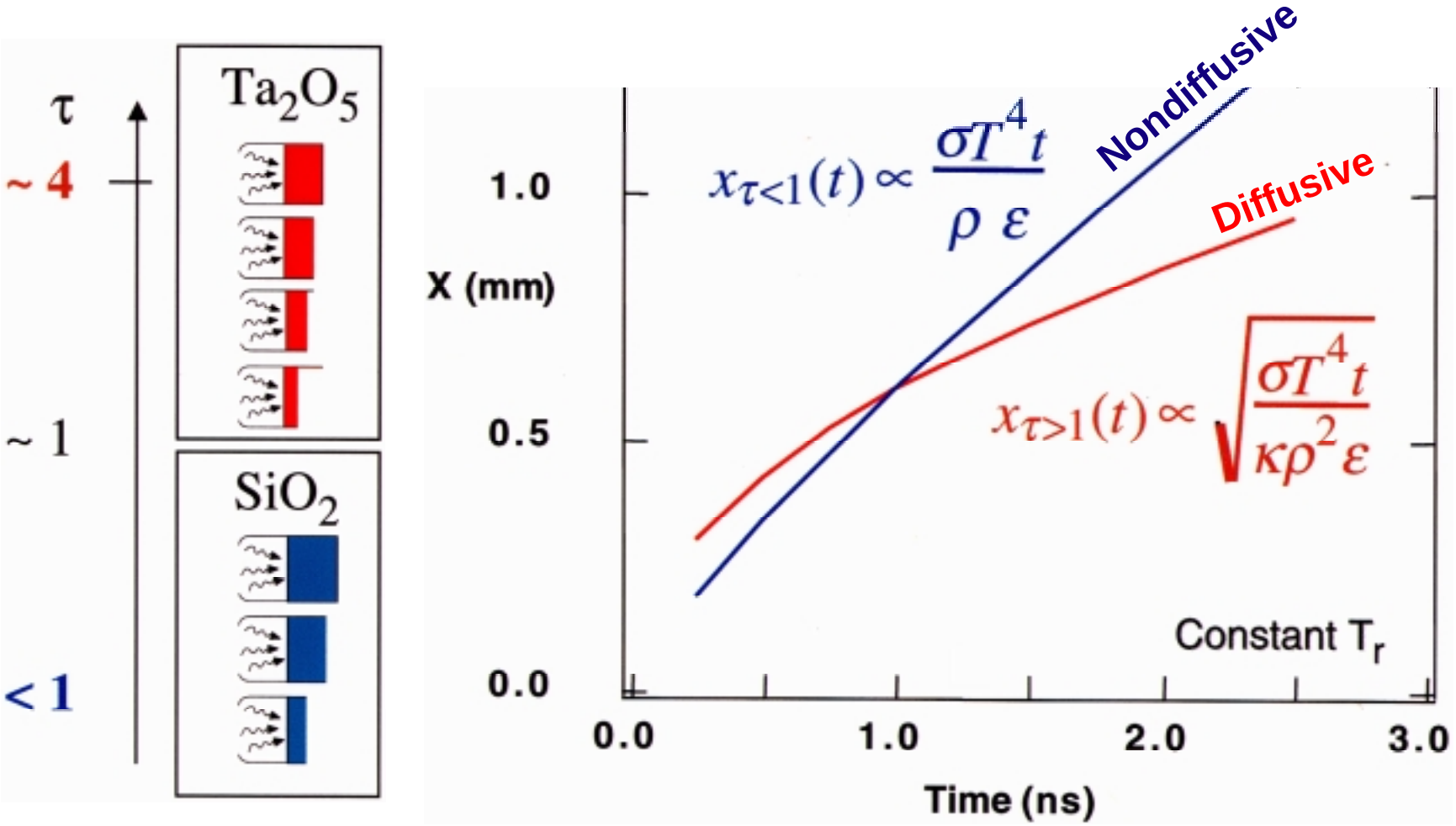
T.S. Perry *et al.*, JQSRT 51, 273 (1994)

Edwards *et al.*, Phys. Rev. Lett. 67, 3780 (1991)



Radiation_flow_1.vg

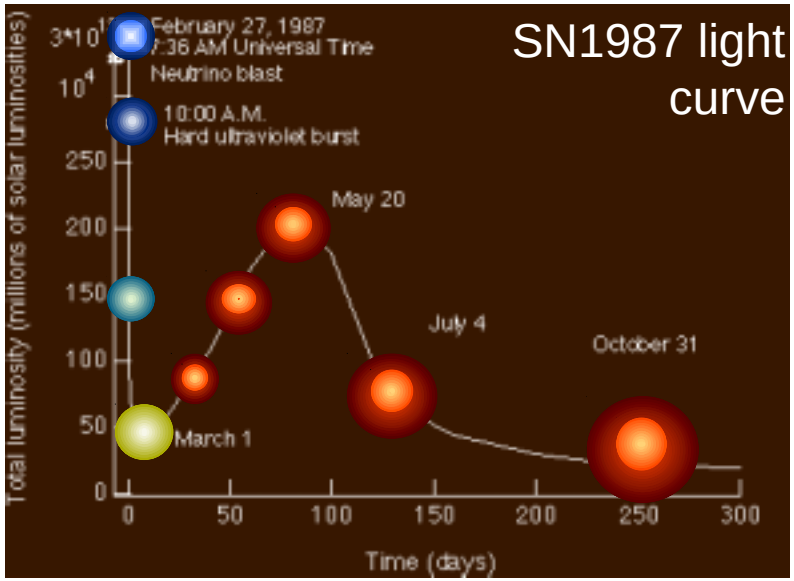
Radiation flow experiments in stationary media are being developed on the Omega laser



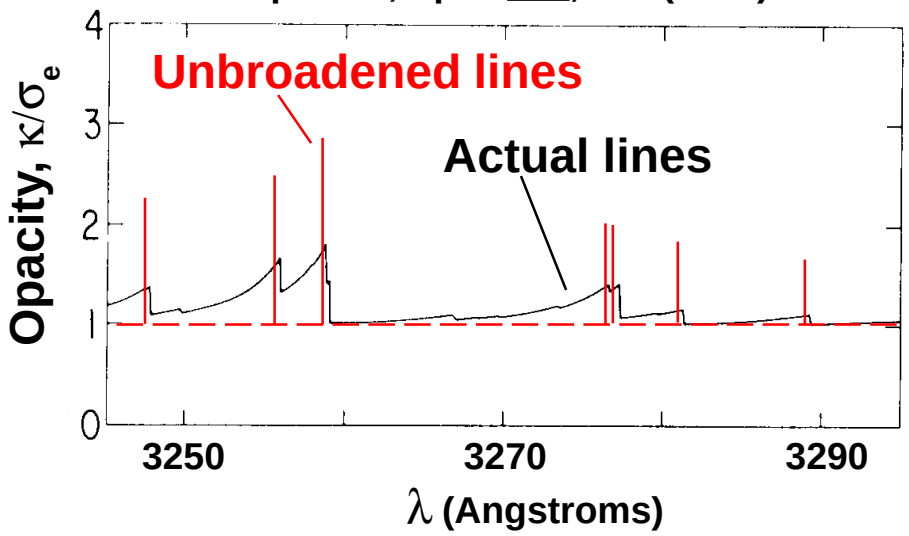
- Both diffusive and nondiffusive regimes are accessed
- See T. Back *et al.*, HI1.03, this conference

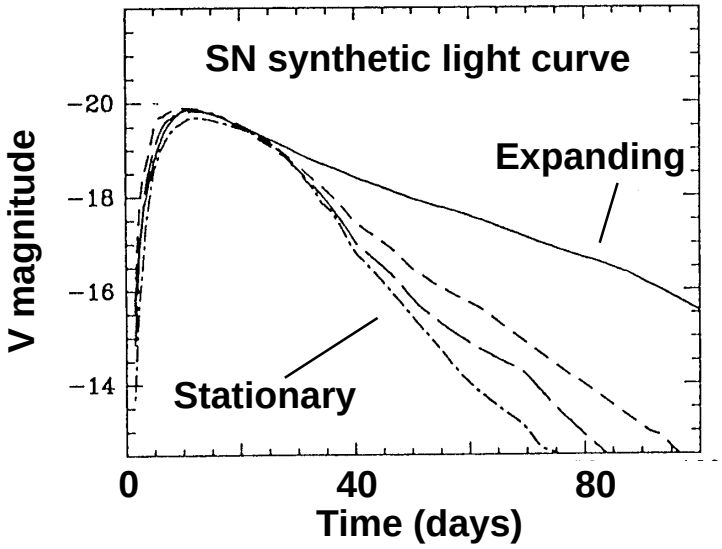
Tina_1.vg

Supernova light curve calculations are sensitive to radiation flow through expanding media



Karp *et al.*, Ap.J. 214, 161 (1977)



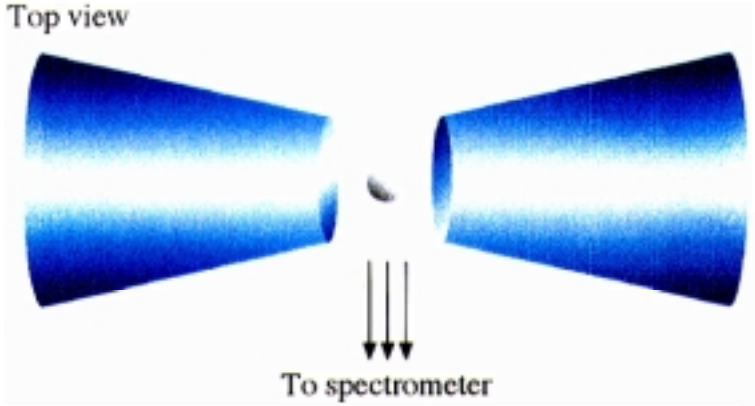


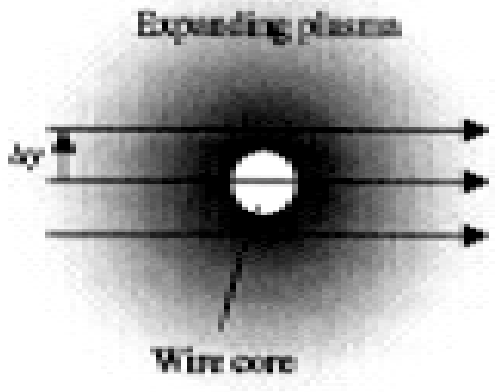
Hoflich *et al.*, A&A 268, 570 (1993)

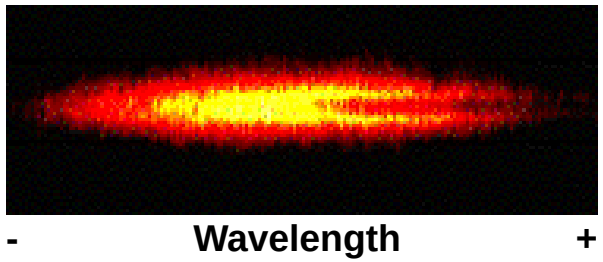
- Homologous expansion:
  - velocity gradients
  - broadening of lines
  - closes up the rad. windows
  - holds the heat in

- SNe used as standard candles
- H_o depends on SN lgt crvs

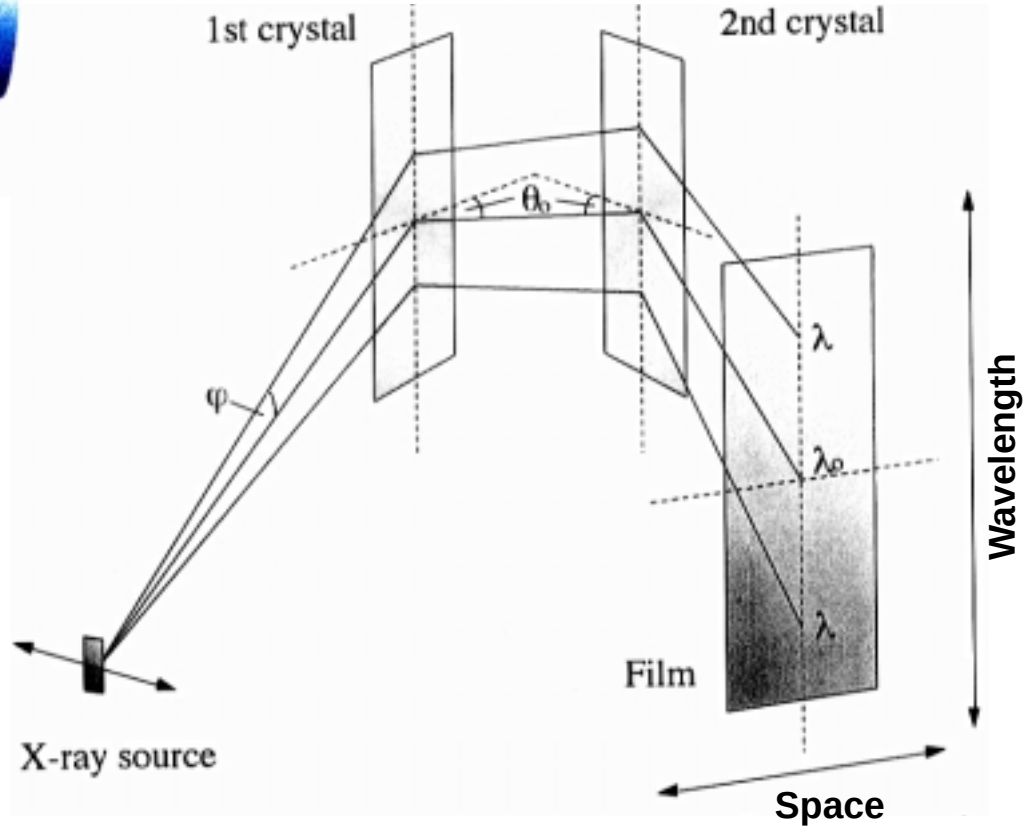
Experiments measuring radiation line transport through 1D cylindrically expanding plasmas have been made on the Trident and Vulcan laser facilities







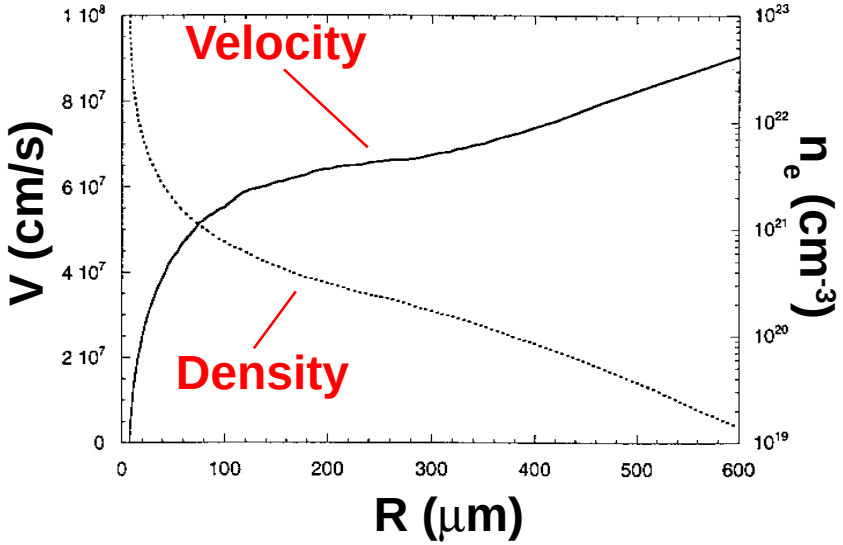
High dispersion, double-crystal spectrometer

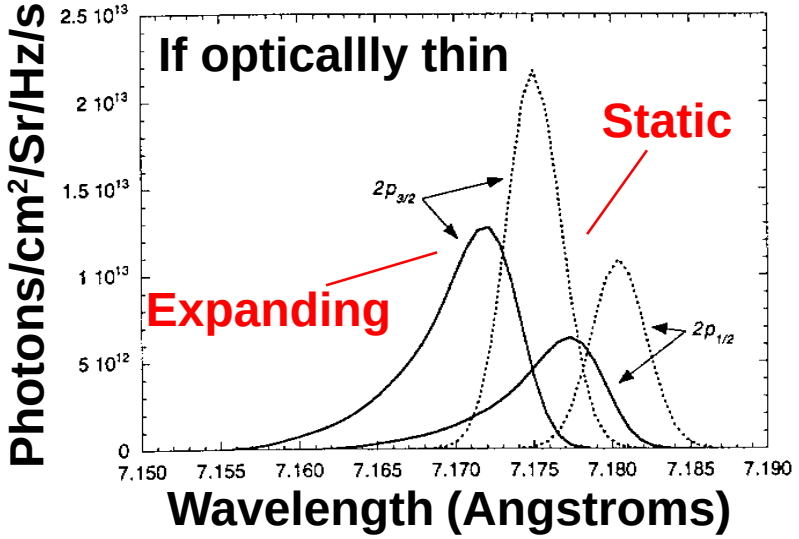


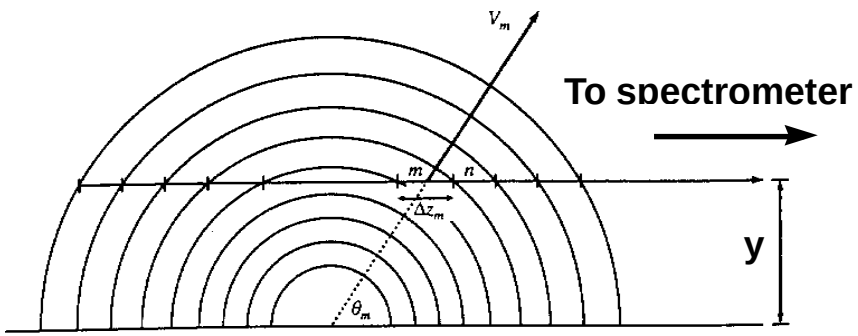
Patel *et al.*, JSQRT 57, 683 (1997)

Patel_2.vg

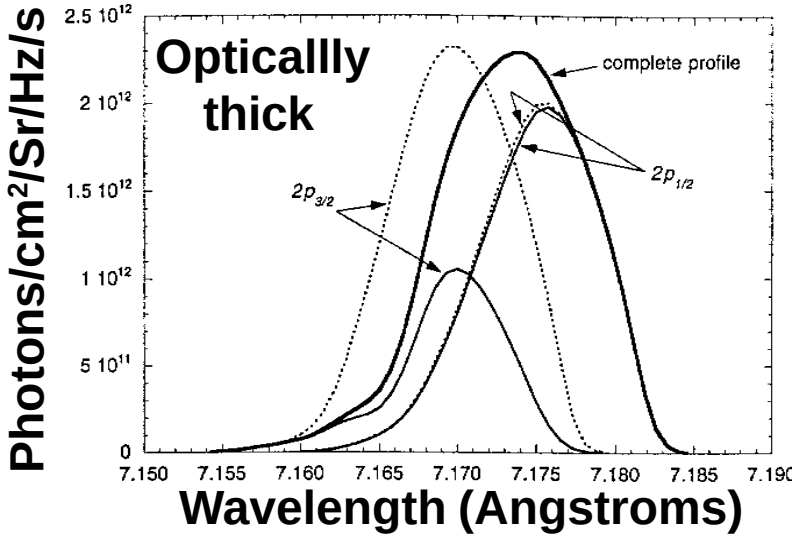
Al cylinders were exploded, giving an expansion plasma that greatly modifies the line transport







Patel *et al.*, JSQRT 57, 683 (1997)



Patel_3.vg